UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/849,353	05/07/2001	Il-Kwon Jeong	11349-P66640US0	8117

7590 10/04/2004

JACOBSON, PRICE, HOLMAN & STERN
PROFESSIONAL LIMITED LIABILITY COMPANY
400 Seventh Street, N.W.
Washington, DC 20004

EXAMINER	
SHARON, AYAL I	

ART UNIT	PAPER NUMBER
2123	

DATE MAILED: 10/04/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/849,353	JEONG ET AL.	
	Examiner	Art Unit	
	Ayal I Sharon	2123	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 May 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *07 May 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *5/7/2001*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Introduction

1. Claims 1-11 of U.S. Application 09/849,353 filed on 05/07/2001 are presented for examination. The application claims foreign priority to Rep. Of Korea Application 2000-83297, filed on 12/27/2000.

Claim Objections

2. Claims 3 and 8 are objected to because of the following informalities: "... provide a signal smoothly" is grammatically incorrect. Appropriate correction is required.

Claim Interpretations

3. Examiner interprets "post processing" as referring to modifications done to data after it is initially sampled.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1,6, and 10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
6. Regarding claims 1, 6, and 10, the phrase "such as" renders the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention. See MPEP § 2173.05(d).
7. Regarding claims 1, 6, and 10, the phrase "etc." renders the claim(s) indefinite because the claim(s) include(s) elements not actually disclosed (those encompassed by "etc."), thereby rendering the scope of the claim(s) unascertainable. See MPEP § 2173.05(d).

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

9. The prior art used for these rejections is as follows:

10. Park, ChanJong et al. "Sensor Fusion for Motion Capture System Based on System Identification". Proc. Computer Animation 2000. May 3-5, 2000. pp.71-76. (Henceforth referred to as "**Park**").

11. The claim rejections are hereby summarized for Applicant's convenience. The detailed rejections follow.

12. **Claims 1, 4-6, and 9-10 are rejected under 35 U.S.C. 102(a) as being anticipated by Park.**

13. In regards to Claim 1, Park teaches the following limitations:

1. A sensor fusion apparatus for optical and magnetic motion capture systems, in a motion capture system for an animation of a motion capture object such as a person or a moving object in a three-dimensional virtual space, etc., said sensor fusion apparatus comprising:

An optical motion capture unit for performing an optical motion capture for the motion capture object, and obtaining an optical marker signal;
(Park, especially: p.72, Section 2, 2nd paragraph)

a magnetic capture unit for performing a magnetic motion capture for the motion capture object, and gaining a magnetic sensor signal;
(Park, especially: p.72, Section 2, 2nd paragraph)

a virtual optical marker signal converting unit for converting the magnetic sensor signal obtained through the magnetic motion capture unit into a corresponding optical marker signal, and acquiring a virtual optical marker signal;
(Park, especially: p.72, Section 2, last paragraph)

a signal outputting unit for outputting the optical marker signal gained through the optical motion capture unit, as it is, at a normally operating section of the optical motion capture system, and outputting a dynamically modeled signal gotten through the system identification unit at an abnormally operating section thereof, according to a normal or abnormal state of the optical marker signal.
(Park, especially: p.73, Section 3, 3rd paragraph;
and p.74, Section 4.2, last paragraph)

14. In regards to Claim 4, Park teaches the following limitations:

4. The apparatus as recited in claim 1, wherein said virtual optical signal converting unit detects a position of a virtual optical marker corresponding to a magnetic sensor through a positional and rotational conversion, by using a relative position and orientation of an optical marker and a magnetic sensor stuck to the motion capture object.
(Park, especially: Fig.1, and p.72, col.2, paragraphs 1 and 2)

15. In regards to Claim 5, Park teaches the following limitations:

> 5. The apparatus as recited in claim 4, wherein said system identification unit estimates the optical marker signal through the magnetic sensor signal and the dynamic model even in case that there does not exist the optical marker signal, by modeling the relation between the optical marker signal and the magnetic sensor signal (preferably, by providing the virtual optical marker signal as an input and the optical marker signal as an output) to the dynamic model through a system identification method.
> (Park, especially: p.73, Section 3, "System Identification")

16. In regards to Claim 6, Park teaches the following limitations:

> 6. A sensor fusion method for optical and magnetic motion capture systems, in a motion capture system for an animation of a motion capture object such as a person or a moving object in a three-dimensional virtual space, etc., said sensor fusion method comprising:
>
> a first step of obtaining an optical marker signal and a magnetic sensor signal for the motion capture object;
> (Park, especially: p.72, Section 2, 2nd paragraph)
>
> a second step of converting the magnetic sensor signal into a corresponding optical marker signal, and acquiring a virtual optical marker signal;
> (Park, especially: p.72, Section 2, 2nd paragraph)
>
> a third step of modeling a relation between the virtual optical marker signal and the optical marker signal to a dynamic model through a system identification; and
> (Park, especially: p.72, Section 2, last paragraph)
>
> a fourth step of using the optical marker signal as it is, when the optical marker signal is normal, and using a signal gained by inputting the virtual optical signal into the dynamic model, as a usage for a correction of the optical marker signal, by using the dynamic model when the optical marker signals are discontinuous, according to a normal or abnormal state of the optical marker signal.
> (Park, especially: p.73, Section 3, 3rd paragraph; and p.74, Section 4.2, last paragraph)

17. In regards to Claim 9, Park teaches the following limitations:

> 9. The method as recited in claim 6, wherein in said second step, a position of a virtual optical marker

corresponding to a magnetic sensor is detected through a positional and rotational conversion, by using a relative position and orientation of an optical marker and the magnetic sensor stuck to the motion capture object.
(Park, especially: Fig.1, and p.72, col.2, paragraphs 1 and 2)

18. In regards to Claim 10, Park teaches the following limitations:

10. A record medium capable of being read through a computer having a writing of a program, in a sensor fusion apparatus having a processor, which is provided for the sake of a sensor fusion in a motion capture system for an animation of a motion capture object such as a person or a moving object in a three-dimensional virtual space, etc., said record medium characterized in that said program is provided to realize,

a first function of obtaining an optical marker signal and a magnetic sensor signal for motion capture object;
(Park, especially: p.72, Section 2, 2nd paragraph)

a second function of converting the magnetic sensor signal into corresponding optical marker signal, and acquiring a virtual optical marker signal;
(Park, especially: p.72, Section 2, 2nd paragraph)

a third function of modeling a relation between the virtual optical marker signal and the optical marker signal to a dynamic model through a system identification; and
(Park, especially: p.72, Section 2, last paragraph)

a fourth function of using the optical marker signal as it is, when the optical marker signal is normal, and using a signal gained by inputting the virtual optical signal into the dynamic signal, as a usage for a correction of the optical marker signal, by using the dynamic model when the optical marker signals are discontinuous, according to a normal or abnormal state of the optical marker signal.
(Park, especially: p.73, Section 3, 3rd paragraph; and p.74, Section 4.2, last paragraph)

Claim Rejections - 35 USC § 103

19. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

20. The prior art used for these rejections is as follows:

21. Park, ChanJong et al. "Sensor Fusion for Motion Capture System Based on System Identification". Proc. Computer Animation 2000. May 3-5, 2000. pp.71-76. (Henceforth referred to as "**Park**").

22. Welch, G. et al. "SCAAT: Incremental Tracking with Incomplete Information". Proc. of the 24th Int'l ACM Conf. on Computer Graphics and Interactive Techniques. 1997. ISBN: 0-89791-896-7. pp.333-344. (Henceforth referred to as "**Welch**").

23. Hamming, R.W. Digital Filters. ©1997. ISBN: 0-13-212571-4. pp.xi-xii and pp.95-104. (Henceforth referred to as "**Hamming**").

24. The claim rejections are hereby summarized for Applicant's convenience. The detailed rejections follow.

25. Claims 2, 7, and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Park in view of Welch.

26. In regards to Claim 2,

2. The apparatus as recited in claim 1, further comprising a post processing unit for regarding an output signal outputted from the signal outputting unit, as the optical marker signal, and performing a general optical motion capture post processing procedure.

Park teaches the intention to pursue "future work" in "Estimating the noise variation in both markers as the motion speed changes" (Park, p.75, Section 5).

However, Park does not expressly teach the implementation of such a "post-processing procedure."

Welch, on the other hand, expressly teaches the use of the Kalman filter (Kalman, section 2.4). The Kalman filter is a "post-processing" procedure because it takes place after the sampling of the initial data.

It would have been obvious to one of of ordinary skill in the art at the time the invention was made to modify the teachings of Park with those of Welch, because according to Welch (Section 2.4, 1st paragraph), "The Kalman filter [26] has been widely used for data fusion."

27. In regards to Claim 7,

> 7. The method as recited in claim 6, further comprising a fifth step of regarding an output signal outputted from the fourth step, as the optical marker signal, and performing a general optical motion capture post processing procedure.

Park teaches the intention to pursue "future work" in "Estimating the noise variation in both markers as the motion speed changes" (Park, p.75, Section 5).

However, Park does not expressly teach the implementation of such a "post-processing procedure."

Welch, on the other hand, expressly teaches the use of the Kalman filter (Kalman, section 2.4). The Kalman filter is a "post-processing" procedure because it takes place after the sampling of the initial data.

It would have been obvious to one of of ordinary skill in the art at the time the invention was made to modify the teachings of Park with those of Welch,

because according to Welch (Section 2.4, 1st paragraph), "The Kalman filter [26] has been widely used for data fusion."

28. In regards to Claim 11,

> 11. The record medium as recited in claim 10, characterized in that said program is provided to further realize a fifth function of regarding an output signal outputted from fourth function, as the optical marker signal, performing general optical motion capture post processing procedure.

Park teaches the intention to pursue "future work" in "Estimating the noise variation in both markers as the motion speed changes" (Park, p.75, Section 5).

However, Park does not expressly teach the implementation of such a "post-processing procedure."

Welch, on the other hand, expressly teaches the use of the Kalman filter (Kalman, section 2.4). The Kalman filter is a "post-processing" procedure because it takes place after the sampling of the initial data.

It would have been obvious to one of of ordinary skill in the art at the time the invention was made to modify the teachings of Park with those of Welch, because according to Welch (Section 2.4, 1st paragraph), "The Kalman filter [26] has been widely used for data fusion."

29. Claims 3 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Park in view of Welch and further in view of Hamming.

30. In regards to Claim 3, Park does not expressly teach the following limitations:

> 3. The apparatus as recited in claim 2, further comprising a filtering unit for filtering the output signal of the signal outputting unit before the post processing procedure performed in the post processing unit, to eliminate an unnecessary high-frequency component from the output signal of the signal outputting unit and provide a signal smoothly.

Hamming, on the other hand, teaches the use of a low-pass filter (see Chapter 6, section 6.1, p.95; and section 6.2, pp.98-100). Hamming defines a low-pass filter as follows:

> Recall that the typical smoothing filter was a *lowpass filter*, meaning that the low frequencies "pass" through and the high frequencies are "stopped" (eliminated) with a transition zone between the pass and stop bands (or frequencies).

It would have been obvious to one of ordinary skill in the art to modify the teachings of Park with those of Hamming, because "The ideas, methods, and results in the field of digital filters are related to 1. statistics, especially time series analysis, 2. numerical analysis, ..." (Hamming, p.xi), and also because "The processes of smoothing, predicting, differentiating, integrating, separating signals (filtering), and removing the noise of measurement are very common operations" (Hamming, p.xi).

31. In regards to Claim 8, Park does not expressly teach the following limitations:

> 8. The method as recited in claim 7, further comprising a sixth step of filtering the output signal before the post processing procedure, to eliminate an unnecessary high-frequency component from the output signal outputted from said fourth step and provide a signal smoothly.

Hamming, on the other hand, teaches the use of a low-pass filter (see Chapter 6, section 6.1, p.95; and section 6.2, pp.98-100). Hamming defines a low-pass filter as follows:

> Recall that the typical smoothing filter was a *lowpass filter*, meaning that the low frequencies "pass" through and the high frequencies are "stopped" (eliminated) with a transition zone between the pass and stop bands (or frequencies).

It would have been obvious to one of ordinary skill in the art to modify the teachings of Park with those of Hamming, because "The ideas, methods, and results in the field of digital filters are related to 1. statistics, especially time series analysis, 2. numerical analysis, ..." (Hamming, p.xi), and also because "The processes of smoothing, predicting, differentiating, integrating, separating signals (filtering), and removing the noise of measurement are very common operations" (Hamming, p.xi).

Correspondence Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ayal I. Sharon whose telephone numbers are (703) 306-0297 *[Before Oct. 25, 2004]* and (571) 272-3714 *[After Oct. 25, 2004].* The examiner can normally be reached on Monday through Thursday, and the first Friday of a biweek, 8:30 am – 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kevin Teska can be reached at (703) 305-9704 *[Before Oct. 25, 2004]* and (571) 272-3716 *[After Oct. 25, 2004].*

Any response to this office action should be faxed to (703) 872-9306 or mailed to:

Director of Patents and Trademarks
Washington, DC 20231

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Tech Center 2100 Receptionist, whose telephone number is (703) 305-3900 *[Before Oct. 25, 2004]* or (571) 272-2100 *[After Oct. 25, 2004]*.

Ayal I. Sharon

Art Unit 2123

September 29, 2004

KEVIN J. TESKA
SUPERVISORY
PATENT EXAMINER